

STUDIES IN THE FLORA OF BOLIVIA — IV.

ROBERT C. FOSTER

Continued from Vol. 68, No. 773

11. *Briza* L.

See Parodi in *Revist. Fac. Agron. Vet. Buenos Aires*, 3: 113-158 (1920).

Perennials, the erect culms 2-8 dm. high. Leaves chiefly basal, much shorter than the inflorescence, glabrous, often scabridulous, 1-2 mm. wide. Inflorescence a loose to dense racemose panicle. Spikelets oblong-elliptic, longer than broad, but the shorter ones verging on the suborbicular, usually many-flowered, the crowded florets erect to nearly horizontal, the naked rachilla disarticulating above the glumes; glumes subequal, the margins scarious, awnless; lemmas awnless, more or less wing-margined and closely imbricate.

Lemmas, and often the glumes, tuberculate-scabrid; lemmas about 2 mm. long; palea glabrous. 1. *B. Mandoniana*.

Lemmas and glumes not tuberculate-scabrid; lemmas to 5 mm. long; palea covered with gland-tipped hairs. 2. *B. paleapilifera*.

1. *Briza Mandoniana* (Griseb.) Henrard in *Meded. Rijks Herb. Leiden*, no. 40: 70 (1921). *B. Mandoniana* var. *tuberculata* Henrard in *Meded. Rijks Herb. Leiden*, no. 40: 71 (1921). *B. Mandoniana* var. *Herzogiana* Henrard in *Meded. Rijks Herb. Leiden*, no. 40: 71 (1921). *B. Mandoniana* var. *vallegrandensis* Henrard in *Meded. Rijks Herb. Leiden*, no. 40: 71 (1921). Spikelets 3-5 mm. long, oblong-elliptic, with up to 8 florets. Glumes 2-2.5 mm. long, broadly ovate, often scabrid to tuberculate, the scabrid apex somewhat erose, the basal margins shortly ciliate. Palea shorter than the lemma, bicarinate, the keels ciliolate. LA PAZ: LARECAJA: vic. Sorata; Lacatia and Lancha de Cochipata, 3200-3600 m., *Mandon* 1356 (GH; type-number); Cerro del Iminapi, 2650 m., *Mandon* 1355 (GH); Sorata, 4300 m., *Rusby* 238 (GH); NOR YUNGAS: Pongo, 3640 m., *Hitchcock* 22773 (GH).

2. *B. paleapilifera* Parodi in *Revist. Fac. Agron. Vet. Buenos Aires*, 3: 124, fig. 2, no. 5 (1920). *B. stricta* of the Catalogue.* Plants to

*The Catalogue refers to A Catalogue of Ferns and Flowering Plants of Bolivia, in *Contrib. Gray Herb.* no 184 (1958).

6 dm. high. Leaf-blades to 2 mm. wide, glabrous to slightly scabridulous above and beneath. Panicle 7-12 cm. long, the rachis, branches and pedicels scabrid, at least in part. Spikelets oblong-elliptic, to 7 mm. long, to 8-12-flowered. Glumes to 4.5 mm. long, broadly ovate, 5-7-nerved, subacute to obtuse. Lemmas to 3-5 mm. long, subquadrate, the apex coarsely 3-lobed, the lateral lobes broad, obtusely rounded,

the central lobe triangular, acute, keel prominent, thickened, the lateral nerves with a basal vertical line of short, thick, unicellular hairs. Palea oval, subacute to obtuse, about 2 mm. long, the dorsal surface with numerous short gland-tipped hairs. bicarinate, the keels narrowly winged, short-ciliate. COCHABAMBA: CERCADO: Cochabamba, Holway 383 (US).

The Holway collection is the basis on which Hitchcock ascribed *Briza stricta* to Bolivia in his treatment of the Andean grasses. No Bolivian material of *B. Stricta* has been seen.

Briza spicigera (Presl) Steud. Nomencl. (ed. 2) 1: 225 (1840). No material has been seen from Bolivia, but it has been ascribed to that country by Pilger in Notizbl. 11: 780 (1933). The basis for this consists of two Troll collections, no. 632 from CHUQUISACA: TOMINA: Alto de Escalón, and no. 834, from the Alto de Cuchilla, which I have been unable to locate. If the species should be found, it can be distinguished by the laterally compressed lemmas which are finely and densely papillate, emarginate at the apex, with the markedly thickened and prominent keel excurrent as a short thick mucro or cusp. The species is apparently identical with *Briza uniola* (Nees) Nees ex Steud. Syn. Pl. Glum. 1: 283 (1854). If this is the case, the latter name should be applied to it, for its basionym, *Eragrostis uniola* Nees, was published a year earlier than the basionym of *Briza spicigera*, *Chascolytrum spicigerum* Presl. It has been illustrated by Parodi, l. c., under the name *Briza uniola*.

12. *Eragrostis* Beauv.

Annuals or perennials, from very low mat-forming plants to erect plants up to 2 m. high. Leaves flat or involute, seldom equaling or exceeding the inflorescence at maturity. Inflorescence a terminal racemose panicle, from dense, with erect compact branching, to very open, with freely and widely spreading branches, the spikelets 2-36-flowered disarticulating above the awnless glumes, the rachilla usually glabrous. Lemmas awnless, occasionally the lowermost sterile, but sterile and reduced florets usually borne at the tip, the paleas usually persistent on the rachilla after the fall of the lemmas and caryopses.

- a. Palea long-ciliate, the conspicuous hairs up to 1 mm. long. 1. *E. ciliaris*.
- a. Palea short-ciliate at most, the hairs inconspicuous.
 - b. Largest spikelets at least 1 cm. long.
 - c. Axils of inflorescence, at least the lowermost, pilose.
 - d. Glumes equal or subequal.
 - e. Glumes gland-dotted on keel, especially near the apex. 3. *E. cilianensis*.
 - e. Glumes not gland-dotted on keel. 12. *E. bahiensis*.

- d. Glumes distinctly unequal. 5. *E. maypurensis*.
- c. Axils of inflorescence glabrous. 2. *E. hypnoides*.
- b. Largest spikelets less, usually much less, than 1 cm. long.
- f. Axils of inflorescence glabrous.
- g. Plants to 2 m. high, the leaf-blades to 6 mm. wide, scabridulous on both surfaces. 4. *E. glomerata*.
- g. Plants less than 1 m. high, the leaf-blades 2-3 mm. wide.
- h. Glumes equal or subequal.
- i. Spikelets 1 mm. wide, 2-6-flowered. 7. *E. nigricans*.
- i. Spikelets 2 mm. wide, with 7 or more florets. 9. *E. mexicana*.
- h. Glumes definitely unequal. 13. *E. expansa*.
- f. Axils of inflorescence, at least the lowermost, pilose to some extent.
- j. Lemmas 1.5 mm. or less in length.
- k. Largest spikelets 7 mm. long, with up to 12 florets. 6. *E. articulata*.
- k. Largest spikelets 5 mm. long, with up to 9 florets. 11. *E. montufari*.
- j. Lemmas 2 mm. or more in length.
- l. Rachilla puberulent. 10. *E. lurida*.
- l. Rachilla glabrous, or with 1-2 short hairs at most below a floret.
- m. Leaf-blades glabrous beneath, scabridulous above. 8. *E. pilosa*.
- m. Leaf-blades at least sparsely pilose above.
- n. Panicle to 20 cm. long, leaf-blades sparsely pilose. 14. *E. lugens*.
- n. Panicle to 3 dm. long, leaf-blades and sheaths densely pilose. 15. *E. polytricha*.

1. *Eragrostis ciliaris* (L.) Link, Hort. Berol. 1: 192 (1827). Annual, to 4 dm. high. Leaf-sheaths long-pilose at apex, blades flat, to 4 mm. wide, sparsely long-pilose at base, scabridulous above. Panicle dense, interrupted below and often above, the rachis glabrous, branches and pedicels scabridulous. Spikelets about 3 mm. long, with up to 8 florets, the rachilla glabrous. First glume about 1 mm. long, 1-nerved, the keel scabridulous; second glume about 1.5 mm. long, 1-nerved, the keel scabridulous. Lowest lemmas 1.5 mm. long, 3-nerved, the lateral nerves submarginal, minutely scabridulous; width (folded) 0.5 mm. Palea shorter than lemma, the 2 keels long-ciliate, the hairs up to 1 mm. long. SANTA CRUZ: SARA: Dolores, Steinbach 1831 (GH).

2. *E. hypnoides* (Lam.) BSP. Prelim. Cat. N. Y. 69 (1888). Annual, often forming prostrate mats, culms to 1 dm. high. Leaf-sheaths ciliate and sparsely pilose at apex, the short blades to 2 cm. long, flat or somewhat involute, sparsely pilose above, glabrous beneath. Rachis and pedicels glabrous, or the pedicels with a few short hairs at

base or apex. Largest spikelets to about 1.5 cm. long, commonly about 1 cm. long, with up to 25 florets, the rachilla glabrous. First glume 1.5 mm. long, 1-nerved, the keel scabridulous; second glume to 2.5 mm. long, 1-nerved, the keel scabridulous. Lowest lemmas to 2.5 mm. long, 3-nerved, the keel scabridulous, width (folded) about 0.6 mm. Palea about 1 mm. long, the 2 keels distinctly ciliolate. BENI: CERCADO MOJOS: Trinidad, 200 m., *Cárdenas* 3536 (GH). LA PAZ: LA-RECAJA: Guanai, 650 m., *Rusby* 230 (GH). SANTA CRUZ: SARA: Palometilla, *Steinbach* 2914 (GH).

3. *E. cilianensis* (All.) ex Vign. Lut. in *Malpighia*, 18: 386 (1904). Annual, to 5 dm. high, but usually shorter, the leaf-sheaths ciliate, pilose around the apex, the blades flat, to 4 mm. wide, scabrid-ciliate, otherwise glabrous. Panicle to 1 dm. long, fairly compact, the rachis glabrous, the pedicels usually scabridulous. Spikelets to 1 cm. long, with up to 20 florets, the rachilla glabrous. Glumes equal, to 1.5 mm. long, 1-nerved, the nerve with 1-2 glandular dots and scabridulous at the apex. Lowest lemmas about 2 mm. long, 3-nerved, the keel gland-dotted and scabridulous at the apex, scabridulous between lateral nerves and margin, width (folded) 1 mm. Palea about 1.5 mm. long, the 2 keels ciliate. Bolivian Plateau: *Bang* 1078 (GH). COCHABAMBA: CERCADO: Cochabamba, 2700 m., *Eyerdam* 24882 (GH). SANTA CRUZ: SARA: Buenavista, *Steinbach* 1944 (GH).

4. *E. glomerata* (Walt.) L. H. Dewey in *Contrib. U. S. Nat. Herb.* 2: 543 (1894). Annual, to 2 m. high. Leaf-sheaths glabrous, the long-attenuate flat blades to 30 cm. long and 6 mm. wide, scabridulous on both surfaces. Panicle to 4 dm. long, narrow, the branches erect, appressed, rachis and pedicels scabridulous. Spikelets about 3 mm. long, or less, with up to 7 florets, the rachilla glabrous. Glumes equal, 1 mm. long or less, 1-nerved, the keel sparsely scabridulous. Lowest lemmas about 1 mm. long, 3-nerved, the keel scabridulous, width (folded) less than 0.5 mm. Palea about 0.5 mm. long, the keels short-ciliate. LA PAZ: SUR YUNGAS: Covendo, *White* (M. E.)* 915, 1000 (Hitchcock).

5. *E. maypurensis* (HBK.) Steud. *Syn. Pl. Glum.* 1: 276 (1854). Annual, to 3 dm. high, leaves mostly basal, short, the sheaths pilose, the narrow blades pilose, at least when young. Panicle to 15 cm. long, the rachis and pedicels glabrous to pilose. Spikelets very variable, the largest 1-2.5 cm. long, with up to 36 florets, the rachilla glabrous. First glume to 2.5 mm. long, 1-nerved; second glume to 3 mm. long, 3-nerved, broader than the first. Lowest lemmas to 3 mm. long, long-acute or acuminate, 3-nerved, the keel scabridulous, width (folded) 1 mm. Palea nearly 2 mm. long, the keels short-ciliate.

*The initials M. E. refer to collections made on the Mulford Biological Exploration. The number-series of these collections duplicates other number-series of the same collectors.

SANTA CRUZ: SARA: Dolores, near Buenavista, 500 m., *Steinbach* 6138 (GH).

6. *E. articulata* Nees, *Agrost. Bras.* 502 (1829). Annual, to 4 dm. high. Leaf-sheaths sparsely pilose, the flat, short blades 2-4 mm. wide, densely papillose-hispid, especially beneath. Panicle usually about half the total length of culms, open, the branches distant, the rachis glabrous, branches and pedicels sparsely scabridulous. Largest spikelets to 7 mm. long, 1 mm. wide, with up to 12 florets, the rachilla glabrous. First glume 1 mm. long, 1-nerved, the keel scabridulous; second glume about 1.5 mm. long, obscurely 3-nerved, the keel scabridulous. Lowest lemmas about 1.5 mm. long, 3-nerved, width (folded) 0.5 mm. Palea shorter than lemma, bicarinate, the keels glabrous, the margins finely ciliolate. COCHABAMBA: MIZQUE: near Vilavila, 2700 m., *Eyerdam* 24965 (GH). SANTA CRUZ: SARA: Buenavista 500 m., *Steinbach* 5182, 6142, 6991 (all GH).

Eragrostis articulata var. *glabrescens* Henrard in *Meded. Rijks Herb. Leiden*, no. 40: 69 (1921) was distinguished as having glabrous leaves. According to Hitchcock (*Contrib. U. S. Nat. Herb.* 24: 338), the "spikelet is more slender and has more florets than those of *E. articulata*, and appears to belong to a distinct species."

7. *E. nigricans* (HBK.) Steud. *Nomencl.* (ed. 2) 1: 563 (1840). *E. subatra* Jedw. in *Mez, Bot. Arch.* 5: 202 (1924). Annual, the decumbent culms to 5 dm. long. Leaf-sheaths glabrous but pilose at the base of the blade, the blades flat, to 3 mm. wide. Panicle dark, to 2 dm. long, open, the branches spreading, rachis, branches and pedicels glabrous. Spikelets 4-6 mm. long, with 2-6 florets, the rachilla glabrous. Glumes equal, about 2 mm. long, the second broader than the first, the keels scabridulous. Lowest lemmas 2.5 mm. long, obscurely nerved, the keel slightly scabridulous, width (folded) 0.7 mm. Palea 2 mm. long, keels ciliolate. LA PAZ: MURILLO: La Paz, 3800 m., *Buchtien* 42 (GH), 3965 (GH), 3300 m., *Bang* 21 (GH), 80 (GH; type-number of *E. subatra*), *Pennell* 14216 (GH); Obrajes, 3300 m., *Buchtien* 562 (GH). POTOSÍ: SUR CHICHAS: Oploca, *Hitchcock* 22928 (GH).

8. *E. pilosa* (L.) Beauv. *Ess. Agrost.* 162 (1812). Annual, to 3 dm. high. Leaf-sheaths long-ciliate, pilose at apex, the flat blades about 2 mm. wide, scabridulous above, glabrous beneath. Panicle open at maturity, to 20 cm. long, rachis glabrous, the branches and pedicels often scabridulous. Spikelets to 5 mm. long, about 1 mm. wide, with up to 8 florets, the rachilla glabrous. First glume about 0.75 mm. long, 1-nerved, the nerve faintly scabridulous; second glume slightly over 1 mm., 1-nerved. Lowest lemmas about 2 mm. long, obscurely 3-nerved, the keel scabridulous, width (folded) about 0.5 mm. Palea somewhat shorter than the lemma, bicarinate. LA PAZ: LARECAJA: vic. Sorata; near Munaypata, 2650-2900 m., *Mandon* 1329 (GH); MURILLO: Obrajes, 3400 m., *Buchtien* 820 (GH). COCHABAMBA: CERCADO: Cocha-

bamba, 2560 m., *Cárdenas* 2471 (GH). SANTA CRUZ: SARA: El Limón, *Steinbach* 1786 (GH). TARIJA: ARCE: Padcaya, 2100 m., *Fiebrig* 2528 (GH).

9. *E. mexicana* (Lag.) Link, Hort. Berol. 1: 190 (1827). Annual, to 4 dm. high. Leaf-sheaths ciliate, pilose at the apex, the blades flat, glabrous, 2-3 mm. wide. Panicle fairly open, the branches distant, to 30 cm. long, rachis glabrous, the branches and pedicels scabridulous. Spikelets to 7-8 mm. long, with 7 or more florets, the rachilla glabrous. Glumes equal or subequal, to 2.5 mm. long, the first 1-nerved, the keel scabridulous, the second obscurely 3-nerved, the keel scabridulous. Lowest lemmas to 2.5 mm. long, the keel scabridulous, apex obtuse to subacute, width (folded) 0.7 mm. Palea to 2 mm. long, the keels ciliate. LA PAZ: SUR YUNGAS: Sirupaya, *Buchtien* 428 in part (Hitchcock).

10. *E. lurida* Presl, Rel. Haenk. 1: 276 (1830). Perennial, very variable in height, up to 1 m. tall. Leaf-sheaths ciliate and pilose at apex, the flat blades to 2 mm. wide, sometimes very sparsely pilose. Panicle to 3 dm. long, the primary branches distant, the rachis glabrous, pedicels finely scabridulous. Spikelets to 5 mm. long, 7-8-flowered, the rachilla puberulent. First glume 1.5 mm. long, keel scabridulous, the second glume 2 mm. long, the keel scabridulous. Lowest lemmas to 2.5 mm. long, 3-nerved, the scabridulous keel very prominent, emarginate at the obtuse apex, width (folded) 0.8 mm. Palea as long as lemma, the keels ciliate. LA PAZ: LARECAJA: vic. Sorata; Ullontiji, 2900 m., *Mandon* 1332 (GH; type-number of *E. bahiensis* var. *boliviensis*); MURILLO: near La Paz, 4000 m., *Rusby* 49 (GH), 3800 m., *Buchtien* (GH).

11. *E. montufari* (HBK.) Steud. Nomencl. (ed. 2) 1: 563 (1840). *E. Buchtienii* Hack. in Fedde, Rep. Sp. Nov. 6: 157 (1908). *E. boliviensis* Jedw. in Mez, Bot. Arch. 5: 205 (1924). Perennial, to 6 dm. high. Leaf-sheaths pilose, at least at apex, the flat blades to 4 mm. wide, pilose above and beneath. Panicle 10-30 cm. long, the primary branches distant, rachis, branches and pedicels scabridulous. Spikelets to 5 mm. long, up to 9 florets, about 1 mm. wide, the rachilla glabrous except for an occasional short hair at the apex of a section. Glumes about equal, 1 mm. long, or a little more, 1-nerved, the keels scabridulous. Lowest lemmas 1.5 mm. long, rounded, obscurely nerved, the keel scabridulous at apex, width (folded) 0.5 mm. Palea about 1 mm. long, bicarinate, the keels glabrous, the margins ciliate. LA PAZ: LARECAJA: vic. Sorata; Cerro del Iminapi, 2650 m., *Mandon* 1330 (GH; type-number of *E. boliviensis*); MURILLO: La Paz, *Bang* 201 (GH); Cotaña, 2450 m., *Buchtien* (GH). COCHABAMBA: CERCADO: Cochabamba, *Hitchcock* 22798 (GH).

12. *E. bahiensis* Schrad. ex Schult. Mant. 2: 318 (1824). Perennial, to 8 dm. high. Leaf-sheaths pilose at apex, the blades 2 mm. wide, flat or somewhat involute, sparsely pilose. Inflorescence a lax to

compressed panicle, to 15 cm. long, the branches distant, the rachis glabrous, branches and pedicels scabridulous. Largest spikelets over 1 cm. long, 3-4 mm. wide, with up to 15 florets, the rachilla glabrous. Glumes subequal, about 2 mm. long, obscurely nerved, the keels scabridulous at apex. Lowest lemmas to 3 mm. long, 3-nerved, the keel very prominent and scabridulous at apex, width (folded) 1 mm. Palea 2 mm. long, bicarinate, the keels glabrous, the margins ciliate. LA PAZ: NOR YUNGAS: Coripata, *Hitchcock* 22681 (GH). SANTA CRUZ: SARA: Buenavista, 500 m., *Steinbach* 5184 (GH), 6881 (GH); Río Perdix, 400 m., *Steinbach* 6889 (GH).

13. *E. expansa* Link, Hort. Berol. 1: 190 (1827). Perennial, to 8 dm. high. Leaf-sheaths pilose at apex, the blades flat to involute, 2 mm. wide, scabridulous above. Panicle open, to 15 cm. long, primary branches distant, rachis glabrous, branches and pedicels scabridulous. Largest spikelets about 5 mm. long (in some non-Bolivian material to 1.5 cm.), 1 mm. wide, with up to 11 florets, the rachilla usually glabrous but occasionally with a few hairs. First glume 1 mm., the keel scabridulous; second glume 1.5 mm., the keel scabridulous. Lowest lemmas 2 mm. long, 3-nerved, the keel scabridulous at the apex, width (folded) 0.5 mm. Palea 1.5 mm. long, keels glabrous, margins ciliate. SANTA CRUZ: SARA: Buenavista, 450 m., *Steinbach* 6853 (GH); Río Perdix, 400 m., *Steinbach* 6899 (GH).

14. *E. lugens* Nees, Agrost. Bras. 505 (1829). *E. soratensis* Jedw. in Mez, Bot. Arch. 5: 213 (1924). Perennial, to 5 dm. high. Leaf-sheaths pilose to sparsely pilose and ciliate, to more or less glabrate, the blades flat to involute, usually sparsely pilose. Panicle open, to 20 cm. long, the primary branches distant, the rachis glabrous, branches and pedicels somewhat scabridulous. Spikelets 5 mm. long, or less, about 1 mm. wide, 5-6-flowered, the rachilla glabrous. First glume 1 mm., the second 1.5 mm. long, the keels scabridulous. Lowest lemmas 2 mm. long, obscurely nerved, the keel and apex slightly scabridulous, width (folded) 0.8 mm. Palea somewhat shorter than the lemma, keels glabrous, margins ciliate. Yungas: *Bang* 307 (GH). LA PAZ: LARECAJA: Sorata, 3300 m., *Rusby* 239 (GH); Cerro del Iminapi, 2650 m., *Mandon* 1283 (GH); Sicasica, 2650-2900 m., *Mandon* 1331 (GH; type-number of *E. soratensis*). COCHABAMBA: MIZQUE: near Vilavila, 2500 m., *Eyerdam* 25021 (GH). SANTA CRUZ: SARA: Buenavista, 450 m., *Steinbach* 7091 bis (GH).

15. *E. polytricha* Nees, Agrost. Bras. 507 (1829). Perennial, up to 1 m. high. Leaf-sheaths densely long-pilose, the blades flat to involute, densely long-pilose. Panicle to 3 dm. long, very open, the rachis, branches and pedicels scabridulous. Spikelets 5 mm. or less, 3-5-flowered, 1.3 mm. wide, the rachilla glabrous with occasionally a few short hairs below the florets. First glume 1 mm. long, the second, 1.5 mm., keels strongly scabridulous. Lowest lemmas to 2 mm. long, keel scabridulous, width (folded) 0.5 mm. Palea 1.5-2 mm.

long, margins ciliolate. SANTA CRUZ: SARA: Buenavista, 450 m., *Steinbach* 6980 (GH).

13. *Distichlis* Raf.

Perennial, plants dioecious, rhizomatous, culms erect, from 3 to 30 cm. high. Leaves glabrous or glaucous or softly puberulent or even pilose, particularly on the sheaths, obviously distichous, shorter to longer than the inflorescence, blades usually folded or involute, 1 mm. wide or less. Inflorescence a terminal racemose panicle, the panicle somewhat condensed. Spikelets few- to many-flowered, the staminate spikelets of a rather softer texture than the pistillate, glumes present, the naked rachilla disarticulating above the glumes, the lemmas rather obscurely nerved.

- a. Dwarf plants, less than 10 cm. high.
 - b. Leaf-sheaths pilose, at least in part, blades usually glabrous; panicles of 1-3 spikelets, the panicle about 1 cm. long. 1. *D. humilis*.
 - b. Leaf-sheaths glabrous or very sparsely pilose at summit, blades glabrous or sparsely pilose when young; panicles longer than 1 cm., with more numerous spikelets. .. 2a. *D. spicata* var. *andina*.
- a. Taller plants, up to 30 cm. high, panicles with numerous spikelets. 2. *D. spicata*.

1. *Distichlis humilis* Phil. in Anal. Mus. Nac. Chile, 8: 86 (1891). Leaf-sheaths closely imbricate, the blades spreading, to 1 cm. long, or less. Spikelets barely or not at all exserted from leaves, to 7 mm. long, 3-6-flowered. Glumes equal to subequal, the second to 4 mm. long. Lemmas to 4.5 mm. long. Palea shorter than the lemma, bicarinate, the keels narrowly winged and minutely ciliolate. POTOSÍ: SUR CHICHAS: Atocha, *Hitchcock* 22876 (GH).

2. *D. spicata* (L.) Greene in Bull. Calif. Acad. Sci. 2: 415 (1887). Plants generally much taller than the preceding, the leaf-blades much longer and often exceeding the inflorescence, the sheaths not closely imbricate. Panicle exserted from the leaves, to 7 cm. long. Spikelets to 1.8 cm. long and up to 20-flowered. Glumes unequal, the first to 1.5 mm. long, the second to 2.5 mm. Lemmas about 3.5 mm. long. Palea as long as the lemma, bicarinate. LA PAZ: MURILLO: La Paz, 3300 m., *Bang* 108 (GH). COCHABAMBA: CERCADO: Valle de Cochabamba, 2600 m., *Steinbach* 8745 (GH). POTOSÍ: SUR CHICHAS: Oploca, *Hitchcock* 22883 (GH), 22884 (GH).

2a *D. spicata* var. *andina* Beetle in Revist. Argent. Agron. 22: 93 (1955). Differs in smaller size, short leaf-blades (to 2 cm.), shorter panicles, smaller and fewer-flowered spikelets. LA PAZ: MURILLO: San Jorge, 3550 m., *Buchtien* 8537 (GH).

Distichlis spicata gamma *marginata* (Phil.) O. Ktze. Rev. Gen. 3 (2): 350 (1898) was recorded for Bolivia by Kuntze,

on the basis of a collection made by him. In view of some of Kuntze's notorious misdeterminations, I hesitate to accept it on such a basis alone.

14. *Arundo* L.

Arundo Donax L. Sp. Pl. 81 (1753). Rhizomatous perennial, the culms to 6 m. high, occasionally branched. Leaves very long, 3-7 cm. wide, the margins scabrid. Inflorescence a large, dense, terminal, drooping, racemose panicle to 6 dm. long. Spikelets to 1.2 cm. long, 3-4-flowered, the florets perfect, successively smaller upwards, the naked rachilla disarticulating above the glumes; glumes somewhat unequal, the first about 1 cm. long, the second 1.4 cm., as long as the spikelet; lemmas about 1 cm. long, hyaline, strongly 3-nerved, apex 2-toothed with a central awn to 3 mm. long, the rounded back and sides densely long-villous; palea to 5 mm. long, obtuse, with 2 prominent marginal nerves, the margins densely ciliate. LA PAZ: NOR YUNGAS: Coroico, *Hitchcock* 22724 (US).

15. *Phragmites* Trin.

Phragmites communis Trin. Fund. Agrost. 134 (1820). Rhizomatous stoloniferous perennial, with culms to 4 m. high. Leaves long, to 5 cm. wide. Inflorescence a terminal, plumose, racemose, tawny panicle, the branches ascending, to 4 dm. long. Spikelets about 1.5 cm. long, 2-7-flowered, the long-villous rachilla disarticulating above the glumes; glumes unequal, the first nearly 5 mm. long, 3-nerved, the second, 6.5 mm. long, 5-nerved, much shorter than the spikelet; lowest floret staminate or sterile, the awnless lemma about 1.2 cm. long; upper florets perfect, the glabrous lemmas long-attenuate into a 6 mm. pseudo-awn; palea about 5 mm. long, acute, slightly bidentate, the margins ciliate. CHUQUISACA: SUR CINTI: Camataquí, about 2500 m., *Fiebrig* 2954 (US).

16. *Cortaderia* Stapf

Large perennials, to 1.5 m. high. Leaves nearly as long as the culms, the blades to 1.5 cm. wide, the margins and midrib scabrous beneath, old leaf-bases coiled at base of plant. Inflorescence a large, terminal, plumose, racemose panicle. Spikelets unisexual or perfect, if unisexual the plants dioecious, 1-several-flowered, the glumes often as long as the spikelet, hyaline, the villous rachilla disarticulating above the glumes; lemmas hyaline, tapering to a long awnlike prolongation or bearing 2 such structures flanking a true awn.

Plants dioecious; lemma not bidentate, with 1 long pseudo-awn. 1. *C. rudijscula*.
Plants not dioecious; lemma bidentate, with 2 long pseudo-awns flanking a long true awn. 2. *C. bifida*.

1. *Cortaderia rudiusecula* Stapf in Gard. Chron. (ser. 3) 22: 396 (1897). Panicle yellowish or purplish, to 6 dm. long, the branches dense and drooping. Staminate spikelets about 1 cm. long, 2-3-flowered (occasionally 1-flowered). Glumes 6-8 mm. long, 1-nerved. Lemmas 5 mm. long, with a 6 mm. pseudo-awn, villous on the back and sides. Palea as long as the lemma. Pistillate spikelets about 1.2 cm. long, about 4-flowered. Glumes nearly equal, 8 and 9 mm. long, 1-nerved. Lemmas about 4 mm. long, the pseudo-awn about 6 mm. long, densely long-villous on back and sides. Palea as long as lemma, bicarinate, the keels ciliolate. LA PAZ: MURILLO: La Paz, 3750 m., *Buchtien* 507 (GH), *Shepard* 167 (GH), 3300 m., *Bang* 26 (GH); SUR YUNGAS: Chulumani, 1600 m., *Hitchcock* 22701 (GH). COCHABAMBA: CHAPARE: Incachaca, 2250 m., *Steinbach* 9493 (GH). POTOSÍ: CHICHAS: Quechisla, *Cárdenas* 98 (GH). SANTA CRUZ: SARA: quebrada del Río Blanco, Cerro Hosana, 1300 m., *Steinbach* 3372 (GH). TARIJA: CERCADO: Tarija, 2850 m., *Fiebrig* 2656 (GH); Paicho, 2900 m., *Fiebrig* 3043 (GH).

2. *C. bifida* Pilger in Engler, Bot. Jahrb. 37: 374 (1906). *C. bifida* var. *grandiflora* Henrard in Meded. Rijks Herb. Leiden, no. 40: 67 (1921). Panicle yellowish to purple, about 2 dm. long, laxer than in *C. rudiusecula*. Spikelets of perfect florets, 3-4 in number, about 8-10 mm. long (excluding the awns). Glumes unequal, 7 and 9 mm. long, hyaline, 1-nerved, long-acute. Lemmas about 5 mm. long, the 2 teeth prolonged into pseudo-awns 6-18 mm. long, true awn 1.1-2.2 cm. long, lemma long-villous, primarily near the base. LA PAZ: MURILLO: Unduavi, 3200 m., *Buchtien* 2575 (GH). SANTA CRUZ: SARA: Cerro La Negra, 1800 m., *Steinbach* 8171 (GH).

17. *Gynerium* Humb. & Bonpl.

Gynerium sagittatum (Aubl.) Beauv. Ess. Agrost. 138 (1812). Large dioecious perennial, to 10 m. high. Leaf-blades to 2 m. long and 4-6 cm. wide, the margins scabrous-serrulate. Inflorescence a terminal, dense, plumose, racemose panicle to 1 m. long, the branches drooping. Spikelets unisexual, usually several-flowered, the naked rachilla disarticulating above the glumes, glumes and lemmas quite different in staminate and pistillate spikelets. Staminate spikelets: 1-3-flowered, 4 mm. long; glumes somewhat unequal, 2.5 and 3 mm. long, hyaline, acute but not produced; lemmas to 3.5 mm. long, glabrous, acute but not produced. Pistillate spikelets: 2-3-flowered, 6 mm. long; glumes very unequal, the first 3-4 mm. long, acute, the second 9-10 mm. long, long-attenuate and produced into a pseudo-awn much exceeding the spikelet; lemmas to 5 mm. long, long-attenuate into a pseudo-awn about 4-5 mm. long, densely long-villous; stigmas black-purple. LA PAZ: NOR YUNGAS: Coripata, *Hitchcock* 22683 (Hitchcock); SUR YUNGAS: Covendo, *White* (M. E.) 901 (US), 984 (US).

18. *Melica* L.

See Papp in Fedde, Rep. Sp. Nov. 25: 97-160 (1928).

Straggling perennials, culms up to 1 m. high, usually shorter. Leaf-sheaths scabrous, the blades flat or involute, occasionally equaling or even exceeding the inflorescence. Inflorescence a rather narrow, terminal, racemose panicle, the branches distant, spreading. Spikelets 1-4-flowered, the lowest 1-2 perfect, the upper 2-3 sterile and aggregated into a clavate mass, the rachilla glabrous or minutely puberulent, disarticulating above the glumes, the spikelet falling as a unit; lemmas densely puberulent or tuberculate-scabridulous.

a. Lowest lemma with large thick hairs on lateral and submarginal nerves. 1. *M. violacea*.

a. Lowest lemma without large thick hairs.

b. Spikelets to 1 cm. long, perfect florets 1-2; leaf-blades flat, 2-6 mm. wide. 2. *M. scabra*.

b. Spikelets to 7 mm. long, 1 perfect floret; leaf-blades narrow, involute. 3. *M. adhaerens*.

1. *Melica violacea* Cav. Ic. 5: 47, t. 472 (1799). Spikelet about 7 mm. long, with 1 perfect floret. First glume suborbicular, about 7 mm. long, prominently nerved on the lower portion, the hyaline margins broad; second glume much narrower, about as long, densely scabridulous-puberulent. Fertile lemmas 5-6 mm. long, many-nerved, densely puberulent. Palea as long as lemma, bicarinate, the keels ciliate, the inter-carinal area scabridulous-puberulent. SANTA CRUZ: VALLEGRANDE: Comarapa, 3000 m., *Steinbach* 8461 (GH).

2. *M. scabra* HBK. Nov. Gen. & Spec. 1: 164 (1816). *M. scabra* var. *glabra* Papp in Fedde, Rep. Sp. Nov. 25: 145 (1928). Spikelets to 6-10 mm. long, with 1-2 perfect florets. Glumes unequal, more or less hyaline, especially on the margin, 1-nerved, the first 8 mm. long, the second to 10 mm. Fertile lemmas to 8 mm. long, the upper portion hyaline, the lower part many-nerved, the nerves and intercostal areas densely tuberculate-scabridulous. Palea to 5 mm. long, bicarinate, the keels ciliate, the back usually puberulent. LA PAZ: LARECAJA: Sorata, *Mandon* 1343 (US).

3. *M. adhaerens* Hack. in Fedde, Rep. Sp. Nov. 6: 158 (1908). *M. adhaerens* var. *tenuis* (Papp) Papp in Notizbl. 10: 412 (1928). *M. Mandonii* Papp in Notizbl. 10: 356 (1928). Spikelet about 7 mm. long, with 1 perfect floret. First glume 7 mm. long, broadest above the middle, abruptly short-acute, 1-nerved; second glume as long, much narrower, the nerves obscure, lower half puberulent-scabrid. Fertile lemma about 6 mm. long, apex hyaline, lower half many-nerved, densely tuberculate-scabrid. Palea about 4 mm. long, bicarinate, the keels ciliate, the back densely puberulent. LA PAZ: MURILLO: Poto-poto, Río Chuquiaguillo, 3700 m., *Mandon* 1357 (GH; type-number of *M. Mandonii*); La Paz, 3300 m., *Bang* 30 (GH), 3500 m., *Buchtien* 505

(GH), 3700 m., *Hitchcock* 22565 (GH). COCHABAMBA: MIZQUE: Vila-vila, 2500 m., *Eyerdam* 24983 (GH).

19. *Anthochloa* Nees

See Matthei in Gayana, Bot. no. 8: 11-15 (1963).

Anthochloa lepidula Nees & Mey. in Meyen, *Reise*, 2: 14 (1835). *A. rupestris* Remy in Ann. Sci. Nat. (Ser. 3) 6: 347 (1846). Densely caespitose dwarf perennial, less than 10 cm. high. Leaf-blades 0.5-1.5 mm. wide, somewhat scabridulous, often exceeding the inflorescence. Inflorescence a greatly reduced racemose panicle, more or less capitate in appearance, sometimes only 1 spikelet to a panicle-branch. Spikelets about 8 mm. long, with 4-6 perfect florets, the naked rachilla disarticulating above the glumes. Glumes hyaline, the apex sometimes erose, 2 and 2.5 mm. long. Lemmas hyaline, scarious, 4 mm. long and 5 mm. wide, deeply bifid. Palea shorter than lemma, hyaline, deeply 2-3-cleft almost to the base. LA PAZ: LARECAJA: vic. Sorata; Lacatia ad La Apacheta, 4500-5000 m., *Mandon* 1372 (GH).

20. *Orthoclada* Beauv.

Orthoclada laxa (Rich.) Beauv. ex Nees, *Agrost. Bras.* 522 (1829). Perennial, stoloniferous, the culms up to 1 m. high. Leaf-sheaths puberulous, the lance-ovate blades to 15 cm. long, and 2.5 cm. wide, scabridulous above, the base long-petiolately attenuate, glabrous. Inflorescence a terminal racemose panicle, the slender branches ultimately divergent, erect-appressed before maturity. Spikelets usually solitary, disarticulating below the glumes, usually with 1 perfect floret but often 2-flowered, fertile floret below sterile, 6-10 mm. long, the rachilla pubescent. Glumes unequal, to 4 and 5 mm. long, the first 3-nerved, main nerve scabrid, the second 5-nerved, all nerves scabrid on upper portion at least. Lemma to 7 mm. long, obscurely 5-nerved, scabrid-puberulent on upper portion. Palea about 4.5 mm., bicarinate, the keels ciliolate. SANTA CRUZ: ICHILO: Río Vibora, 350 m., *Steinbach* 7576 (GH); SARA: Río Surutú, 400 m., *Steinbach* 7294 (GH).

21. *Zeugites* Schreb.

Zeugites mexicana (Kunth) Trin. ex Steud. *Nomencl.* (ed. 2) 2: 798 (1841). *Z. mexicana* var. *glandulosa* Hack. in Fedde, Rep. Sp. Nov. 6: 758 (1908). A slender much-branched perennial, the wiry culms usually less than 30 cm. high. Leaf-sheaths sparsely pilose, especially at the apex; leaf-blades long-petiolate, the petiole pubescent at base and apex, the blades broadly lance-ovate, acute, up to 3 cm. long and 1.5 cm. wide. Inflorescence a few-branched, few-flowered, open, racemose panicle up to 5 cm. long. Spikelets few-flowered (2-3), the lowest floret perfect, the upper florets staminate and decidedly distant from the lowermost, the naked rachilla disarticulating above the glumes, the spikelet falling as a unit; spikelet to 6 mm. long. Glumes

somewhat unequal, 1.5 and 2 mm. long, herbaceous, often purple-tipped, the second 5-nerved, the 3 central nerves connected by conspicuous transverse veinlets, both glumes with 2-3 very short teeth at apex, and with slightly ciliate margins. Lemmas 3 mm. long, 7-nerved, with a very short central apical tooth. Palea as long as the lemma, strongly bicarinate in the upper portion. LA PAZ: NOR YUNGAS: Coripata, *Bang* 2131 (GH); Bella Vista, *Hitchcock* 22751 (GH). COCHABAMBA: CHAPARE: Incachaca, 2600 m., *Steinbach* 9872 (GH).

22. *Triodia* R. Br.

Triodia avenacea HBK. Nov. Gen. & Sp. 1: 156 (1816). Caespitose dwarf perennial, from 3-10 (-20) cm. high. Leaf-sheaths sparsely pilose, the flat blades to 3 cm. long, 2 mm. wide, falcate, pilose above and beneath (at least when young), obtuse, shortly mucronate. Inflorescence a short (1-4 cm.), dense, terminal, racemose panicle, the rachis villous. Spikelets about 6 mm. long, with up to 5 perfect florets, the naked rachilla disarticulating above the glumes. Glumes unequal, the first 5 mm. long, with a ciliate keel, the second, 7-8 mm. long, exceeding the spikelet, the keel scabridulous. Lowest lemma about 4 mm. long, the lemmas decreasing in size upwards on the rachilla, deeply bifid, with a scabridulous 4 mm. awn arising from the base of the sinus, the 2 lobes shortly 2-toothed, the rounded back densely villous at base, ciliate, the hairs increasing in length toward the apex. Palea much shorter than the lemma, bicarinate, the keels ciliate, long-villous between the keels and the margin. POTOSÍ: CERCADO: Potosí, 4000 m., *Cárdenas* 204 (GH).

23. *Pappophorum* Schreb.

Caespitose perennials, the culms 2-5 dm. high. Leaves pubescent or pilose on sheaths and blades, the blades narrow, 1-2 mm. wide, not equaling the inflorescence or sometimes exceeding it. Inflorescence a terminal, narrow, racemose panicle, spicate in appearance. Spikelets 1-3-flowered, the lowest floret perfect, the rest sterile, the puberulent rachilla disarticulating above the thin-textured glumes; lemmas firm or indurate, the apex dissected into numerous awns.

Panicle lead-colored; awns plumose, 3.5-5 mm. long. 1. *P. Wrightii*.
Panicle light to purplish; awns scabrid, 0.5-1 cm. long.

..... 2. *P. mucronulatum*.

1. ***Pappophorum Wrightii*** S. Wats. in Proc. Amer. Acad. 18: 178 (1883). Panicle 2-5 cm. long. Spikelets about 5 mm. long (including the awns). Glumes pilose, the first to 4 mm. long, the second to 5 mm. Lemmas about 1.5-2 mm. long, the awns about 3.5 mm., strongly nerved, short-pilose. Palea as long as the lemma, bicarinate, the keels ciliate, sparsely pubescent between keels and margins. TARIJA: CERCADO: Tarija, *Fries* 1221 (US).

2. ***P. mucronulatum*** Nees, Agrost. Bras. 412 (1829). Panicle 5-10

cm. long. Spikelets about 1.4 cm. long (including the awns). Glumes glabrous, short-awned (awns 1-1.5 mm.), 5 and 6 mm. long. Lemmas about 3.5 mm. long, the awns about 1 cm. long, villous at base externally, internally pubescent, at least at the apex, the nerves not visible on the exterior. Palea as long as the lemma, bicarinate, the keels ciliolate. COCHABAMBA: CERCADO: Cochabamba, *Holway* 367 (US). TARIJA: CERCADO: Tarija, *Fries* 1099 (US).

24. *Agropyron* Gaertn.

Perennial, more or less erect, the culms to 1-2 m. high, basally decumbent, sometimes stoloniferous. Leaf-sheaths usually glabrous but occasionally puberulent; leaf-blades to 12 cm. long and 4 mm. wide, much shorter than the inflorescence, usually glabrous, sometimes puberulent, long-acute. Inflorescence a single spike or raceme, or slightly paniculate (rarely so), the spikelets sessile, subsessile or with a 1 mm. pedicel, sometimes rather unilateral in arrangement. Spikelets solitary, occasionally paired, the rachilla disarticulating above the glumes, few- to several-flowered; glumes awnless, or very short-awned; lemmas awnless or short-awned.

Glumes at least 1 cm. long, with 4-6 prominent nerves; lemmas awnless or shortly mucronulate (mucro 0.75 mm.). 1. *A. attenuatum*.

Glumes less than 1 cm. long, nerves inconspicuous; lemmas with an awn to 7-8 mm. long. 2. *A. breviaristatum*.

1. *Agropyron attenuatum* (HBK.) Roem. & Schult. Syst. Veg. 2: 751 (1817). Spike 7-17 cm. long. Spikelet about 2 cm. long, several-flowered (up to 6), the uppermost a sterile lemma, the 1 below it apparently staminate. Glumes subequal, 1-1.2 cm. long, obtuse. Lowest lemmas 1-1.2 cm. long, lowest shortly tridentate, 5-nerved, its palea 9 mm. long, 2-nerved, the nerves markedly ciliolate. Upper lemmas equal to or slightly shorter than the lowest, the uppermost much shorter. LA PAZ: MURILLO: La Paz, 3700 m., *Buchtien* 8532 (GH); NOR YUNGAS: Pongo, 3640 m., *Hitchcock* 22766 (GH).

2. *A. breviaristatum* Hitchc. in Contrib. U.S. Nat. Herb. 24: 353 (1927). Spikes 10-20 cm. long. Spikelets 1-1.5 cm. long, 3-5-flowered. Glumes subequal, 7-10 mm. long, acuminate, scabridulous, especially on the nerves. Lemmas 8-9 mm. long, scabrid, awned. LA PAZ: OMASUYOS: Isla del Sol, *Asplund* 6461 (*Hitchcock*).

25. *Elymus* L.

Elymus angulatus Presl, Rel. Haenk. 1: 264 (1830). Perennial, culms spreading at base but erect, to 1 m. high, the plants glabrous. Leaf-blades much shorter than the inflorescence, to 6 mm. wide, acute, scabridulous beneath. Inflorescence a terminal spike, with 2 sessile spikelets at a node (rarely solitary ?), the spike, to 15 cm. long. Spikelets about 1.3 cm. long (excluding the awns), up to 6-flowered, always with more than 1 perfect floret, disarticulation above the

glumes; glumes equal or subequal, about 1 cm. long, awn 3 mm. long, apex ciliolate, mid-nerve and awn scabridulous to scabrid, at least on the upper portion of the glume; lemmas distinctly rounded, subterete, about 1 cm. long, awns 4-5 mm. long, scabridulous near the apex, palea nearly as long as the lemma, bicarinate, the keels densely scabrid-ciliate on the upper half; uppermost floret a rudiment, the one below it neuter or possibly sometimes staminate. POTOSÍ: SUR CHICHAS: Oploca, *Hitchcock* 22892 (GH).

26. *Hordeum* L.

Perennials, erect or spreading, or decumbent, sometimes caespitose, usually 2-4 dm. high. Leaves glabrous, the short flat blades to 3 mm. wide, acute, scabridulous beneath, never equaling nor exceeding the inflorescence. Inflorescence a short terminal spike, less than 10 cm. long, with 3 spikelets at a node, the rachis jointed and disarticulating. Spikelets 1-flowered, glumes present, the rachilla disarticulating above the glumes, the lemmas acuminate or shortly or long-awned, the palea bicarinate; central spikelet sessile, the 2 laterals somewhat pedicellate and reduced to slender setose glumes.

Lemmas awnless or very shortly awned; glumes of fertile floret with awns 4 mm. long; rachilla obviously prolonged behind the palea.

..... 1. *H. muticum*.

Lemma with a 6 mm. awn; glumes of fertile floret with awns 1 cm. long; rachilla only slightly or not at all prolonged behind the palea.

..... 2. *H. halophilum*.

1. *Hordeum muticum* Presl, Rel. Haenk. 1: 327 (1830). Spikelet, excluding awns, about 6 mm. long. Glumes reduced virtually to scabridulous awns 4 mm. long. Lemma about 5 mm. long, seldom short-awned. Palea less than 5 mm. long, bicarinate. Sterile glumes reduced to awns 4-5 mm. long. LA PAZ: OMASUYOS: vic. Achacache, 3950 m., *Mandon* 1379 (GH); MURILLO: La Paz, 3750 m., *Buchtien* 55 (GH), *Bang* 179 (GH). POTOSÍ: CERCADO: Potosí, 4000 m., *Cárdenas* 207 (GH). TARIJA: AVILES: Puna Patanca, 3700 m., *Fiebrig* 3193 (GH).

Hordeum nodosum L. Sp. Pl. (ed. 2) 126 (1762) has been ascribed to Bolivia by Hitchcock on the basis of a collection made by Pearce. I have seen no South American material of this species. It is apparently like *H. muticum* but with longer awns.

2. *H. halophilum* Griseb. in Goett. Abh. 19: 249 (1874). Spikelet, excluding awns, about 5 mm. long. Glumes of fertile floret reduced to awns 1 cm. long. Lemma 5 mm. long, with a 6 mm. awn. Palea about 6 mm. long, bicarinate, the apex bidentate. Sterile glumes reduced to awns over 1 cm. long. LA PAZ: MURILLO: La Paz, 3700 m., *Buchtien* 506 (GH).

27. *Lolium* L.

Annual or perennial, 2-8 dm. to 1 m. high. Leaf-blades long, often nearly equaling the inflorescence, to 1 cm. wide, scabridulous beneath. Inflorescence a terminal spike, 2-25 cm. long, the sessile spikelets solitary at the nodes and placed edgewise to the rachis. Spikelets several-flowered, first glume absent from all but the uppermost spikelet, rachilla disarticulating above the glumes, lemmas dorsally rounded, awned or awnless.

- a. Glume to 2 cm. long, usually as long as, often exceeding, the spikelet. 1. *L. temulentum*.
- a. Glume less than 1 cm. long, usually much shorter than the spikelet.
 - b. Lemmas awnless. 2. *L. perenne*.
 - b. Lemmas awned. 3. *L. multiflorum*.

1. *Lolium temulentum* L. Sp. Pl. 83 (1753). Annual. Spikelet 1.5-2 cm. long, with up to 7-8 florets. Second glume to 2 cm. long, almost always longer than the rest of the spikelet, very firm-textured. Lemmas very firm, about 8 mm. long, obscurely nerved, the apex with 2 blunt hyaline teeth and a very short scabrid awn rising from between the bases of the teeth, or the uppermost lemmas sometimes very long-awned. Palea firm-textured, nearly as long as the lemma, the upper margins ciliate. LA PAZ: LARECAJA: vic. Sorata; Cicirca, Munaypata, Mandon 1376 (GH).

1a. *L. temulentum* var. *arvense* (With.) Bab. Brit. Bot. 377 (1843). Differs by awnless lemmas. No material has been seen.

2. *L. perenne* L. Sp. Pl. 83 (1753). Perennial. Spikelet about 1 cm. long, occasionally to 1.5 cm., with up to 10 florets. Second glume about 5 mm. long, more or less obtuse. Lowermost lemmas about 5 mm. long, decreasing in length upward on the spikelet. Palea as long as the lemma, the margins densely and shortly scabrid-ciliate. LA PAZ: MURILLO: La Paz, 3700 m., Buchtien 4487 (GH).

3. *L. multiflorum* Lam. Fl. Franç. 3: 621 (1778). Perennial. Spikelet (excluding awns) to 1.5 cm. long, with up to 10 florets. Second glume about 1 cm. long, rather obtuse. Lemmas to 7 mm. long, the apex bidentate, awns to 6 mm. long. Palea as long as the lemma, the margins ciliate. COCHABAMBA: CERCADO: Valle de Cercado, 2700 m., Steinbach 9549 (GH).

28. *Pariana* Aubl.

See Tutin in Journ. Linn. Soc. Bot. 50: 337-362 (1936).

Perennial, from a creeping scaly rootstock. Leaves few, reduced to sheaths on fertile culms (except in no. 1), leaf-sheaths puberulent to glabrous, the orifice often fimbriate; blades broad, lanceolate to ovate, pubescent to glabrous, often scabrid beneath. Inflorescence condensed, spicate, male spikelets 1-flowered, pedicellate, in whorls of 4-6, usually 5, pedicels often fused marginally, a solitary 1-flowered

female spikelet sessile within the whorl; rachis disarticulating between the whorls. Glumes lateral, flanking the lemma, 1-3 nerved. Lemma ovate to oblong, coriaceous, usually 3-nerved. Palea shorter and thinner than the lemma.

a. Leaf-sheaths without fimbriae at apex; lemmas less than 6 mm. long.

b. Glumes 2-3-nerved; terminal spikelet pistillate. 1. *P. bicolor*.

b. Glumes 1-nerved; terminal spikelet sterile. 2. *P. gracilis*.

a. Leaf-sheaths fimbriate at apex; lemmas about 7 mm. long. 3. *P. Swallenii*.

1. *Pariana bicolor* Tutin in Journ. Linn. Soc. Bot. 50: 355 (1936). Sterile culms to 8 dm. high. Leaf-sheaths imbricate, glabrous, the efimbriate blades to 25 cm. long and 5 cm. wide, oblong to ovate, acuminate, glaucous and scabridulous beneath, glabrous above. Fertile culms to 4.5 dm. high, leaves reduced to sheaths or the uppermost sheath sometimes with a rudimentary blade, sheaths puberulent, the orifice ciliate with short, stiff, white hairs. Inflorescence 5-9 cm. long. Male spikelets in whorls of five, pedicels 2-3 mm. long, puberulous, basally heavily bearded. Glumes 2-2.5 mm. long, acute to acuminate, glabrous or ciliolate, 2-3-nerved, the nerves confluent near the apex. Lemma 3.5-4.5 mm. long, lance-elliptic, acute, midrib prominent, glabrous. Female spikelet: glumes obtuse, 6 mm. long, lemma and palea 6 mm. long. LA PAZ: LARECAJA: Mapiri, 1300 m., *Rusby* 232 (US); San Carlos, Mapiri, 850 m., *Buchtien* 458 (GH; type-number); CAUPOLICÁN: San Buena Ventura, 500 m., *Cárdenas* (M. E.) 1889 (US).

2. *P. gracilis* Doell in Mart. Fl. Bras. 2(2): 337 (1877). Sterile culms leafy, sheaths imbricate, fimbriae lacking. Leaf-blades oblong-lanceolate, to 15 cm. long and 2.5 cm. wide, acuminate. Fertile culms leafless, the inflorescence slender. Male spikelets hardly imbricate, the pedicels to 3 mm. long, pubescent. Glumes to 3 mm. long, acute, 1-nerved. Lemma to 4.5 mm. long, oblong-ovate, acute, glabrous, sometimes red and purplish, the nerves obscure. LA PAZ: CAUPOLICÁN: Mojos, *d'Orbigny* 147 (Tutin).

No material has been available to me and this description has been derived from that of Tutin.

3. *P. Swallenii* R. C. Foster, spec. nov. Culmi steriles ad 6.5 dm., foliati, nodi dense breveque hispidi, vaginae puberulae vel glabrae, ad orem fimbriatae. Laminae (2) inaequales, late ovatae, acutae, ad 30 cm. longae et 10 cm. latae, supra glabrae, subtus glaucae et plus minusve scabridulae. Culmi fertiles ad 2.5 dm., efoliati, pubescentes, vaginis imbricatis glabris vel subpuberulis obtecti. Inflorescentia subcrassa, ad 13 cm. longa. Spiculae masculinae 5 in verticillo, pedicelli ad 3 mm. longi, puberuli, basi barbati, plus minusve coaliti. Glumae ad 4-5 mm. longae, 3-nervatae, acutae vel acuminatae, vel subsetatae, ciliatae, minute papillatae. Lemma 7 mm. longum, ob-

longum, obtusum vel subacutum, glabrum, 5-nervatum, nervis paucis connectentibus prope apicem. Spicula feminea; gluma prima ca. 7-8 mm. longa, 1-nervata, ciliata, puberula; gluma altera breviora, ciliata, glabra, 1-nervata; lemma ca. 6 mm. longum. COCHABAMBA: CHAPARE: Puerto Polonia, Río Coni, 14 km. east of San Antonio, 395 m., Oct., Cárdenas & Cutler 7358 (Typus, in Herb. Gray.).

Since Mr. J. R. Swallen has described a number of new South American species in this genus, it is fitting that this apparent novelty should be named for him.

Pariana lunata Nees, Agrost. Bras. 295 (1829), was ascribed to Bolivia by Hitchcock in his treatment of Andean grasses. The only specimen he cited, however, was sterile. The later monographer, Tutin, saw no Bolivian material, so that its presence in Bolivia is still problematical. Should fertile material be found, it can easily be distinguished from the three other Bolivian species by the fact that the fertile culms bear well-developed leaves rather than, at most, rudimentary leaf-blades.

Pariana zingiberina Doell in Mart. Fl. Bras. 2(2): 337 (1877) was also ascribed to Bolivia by Hitchcock. All the material cited by him was later cited by Tutin under the new species, *P. bicolor* Tutin. No Bolivian material was cited by Tutin for *P. zingiberina*, and it seems almost certain that it is not a member of the Bolivian flora.

To be continued